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# General Notes.

## GEOGRAPHY AND TRAVEL.

**America.—The Gran Chaco.**—Capt. J. Page, of the Argentine Navy, has in the March issue of the Proc. Roy. Geog. Soc. described the Gran Chaco and its rivers, accompanying his description with a map. This tract of flat country, lying between the tropic and 29° S., extends eastward to the Parana and Paraguay, and westward to the province of Santiago del Estero. Its area is 180,000 sq. miles. About one-third belongs to Paraguay, and a small part to Bolivia, but the bulk is in the Argentine Republic. The Argentinian portion is divided into two governorships, the Chaco Central, between the Pilcomayo and the Bermejo, and the Chaco Austral. The latter has extensive primeval forests, and is watered by many small streams. Across the entire Chaco, between 61° and 62° W., extends a depression, causing the waters of that part to be discharged into streams that find their way into the large river by first flowing away from the sea. The Pilcomayo has dark or brownish water, and runs southeast, parallel to the Bermejo, at a distance of about 130 miles. It has never been ascended, and the section between 61° and 62° W. is quite unknown. Both the great rivers are obstructed by narrow argillaceous beds, quite removable, and by fallen trees of indestructible wood, which fall into the river beds through the eating away of the banks beneath them. Neither stream receives tributaries throughout the lower and longer part of its course, but the impermeability of the subsoil prevents undue absorption of the waters. At a spot close to 22° S. the Pilcomayo's main stream, after running due south, turns north, and then again southward, yet some minor branches flow tolerably straight on. It is here that the river has been lost to explorers. Capt. Page states that the expedition commanded by M. Thonar in no way elucidated the geography of the river.

The upper waters of the Pilcomayo are in Bolivia, and it passes through the province of Caiza, the Bolivian Chaco, after leaving the mountains and before reaching the Argentine territory. The Bermejo, so called from the red tint of its waters, is formed by the aggregation of a number of small streams rising in the hilly interior of Bolivia and Argentina, and at Oran, lat. 23° S., where it receives the Zenta, becomes a large river; a few miles below the San Francisco joins it, and from this point to its mouth, 900 miles, it receives no tributary of any importance. All changes in the course of the Bermejo and of the middle and lower sections of the Pilcomayo exhibit a tendency to swerve to the eastward. The most important alteration of recent years was that of the Bermejo, which in 1869–70 became deflected at 23° 40′ S. and 63° 35′ W. from its ancient bed, and did not find a new one until 1872, when the main body of waters took a parallel course to the north and east of the old bed, forming an island 200 miles long. The Gran Chaco is no desert, but a rich alluvial lowland, fitted for colonization, which is hindered by the want of knowledge of the rivers and their shiftings. The forests yield many valuable woods, among them the tatané (*Portiera hygrometrica*), the palo rosa, the *Cesalpinia melanocarpa*) the urendey, rurupay, and quebracho, three species of algarroba or Prosopis, and the palo santo or lignum-vitæ. There are also many native fruits of good quality. The Austral Chaco has been developed along the banks of the Parana, where many prosperous colonies exist, and there is a successful colony about 140 miles from the mouth of the Bermejo. There are not more than 30,000 Indians in the entire Chaco. In the discussion which followed Captain Page's description of the Gran Chaco, Colonel Church said that the rainfall of the Chaco, or forest region, was from November to May, and was a downpour of some eighty inches. The rainy season of the Pampas was not at the same time. During the rains there was at the head-waters of the Bermejo a lagoon forty leagues across. The Pilcomayo, at 180 leagues from its mouth, filtered through a sandy swamp 100 miles across, and its bed above this was a mass of sandbanks, falls, rapids and snags. The Gran Chaco was in flood-time almost a lake region, and the upper Paraguay became an inland ocean. This flood district extended northward to the falls of the Madeira, 11° S., and northwest across the Beni almost to Peru. In the Beni there was a lake of 20,000 square miles, two to seven feet deep. It had been calculated that the Bermejo annually delivered into the Paraguay 6,500,000 cubic yards of detritus. Under these circumstances, navigation of these rivers seemed almost impossible.

**The Selkirk Range Glaciers.**—An interesting account of explorations in the glacier regions of the Selkirk range, west of the Rocky mountain water-divide, on the Canadian and Pacific railway, is given by the Rev. W. S. Green in the March issue of the Royal Geographical Society's proceedings. Mammalian life seems to be particularly abundant in this range, and the strange habit of the Sewellel for gathering flowers and laying them bouquet-fashion, stems together, at the mouth of its burrow, is enlarged upon. The notes are accompanied by a map which shows the great Illecellewaet glacier, with its accompanying névé, the Lily glacier, and those of Sir Donald, Dawson, Deville and Geikie. Most of the glaciers are at heights of from 7500 to 8800 feet, while the mountains rise but to 10,645 (Sir Donald mountain) and 10,622 (Mount Bonney).

**Colonel Labre's Travels.**—Colonel Labre, in 1887, crossed overland from the india-rubber settlements on the Madre de Dios, to the nearest navigable point on the Aquiry tributary of the Purus, in order to ascertain whether there were facilities for the construction of a road, and eventually of a railroad, to supersede the present route down the Madeira, which is so arduous that it needs thirty-four days to pass 161 miles, between San Antonio and the mouth of the Beni. The distance from Novo York, on the Aquiry, to Amapo, on the Madre de Dios, was found to be ninety-three miles, with only two rivers to cross.

The Ibuxy tributary of the Purus had previously been explored by Colonel Labre. In the wet season this river is navigable from its mouth to the falls, 370 miles. Colonel Labre established two rubber stations, in 1884, at the mouth of the Curykethé, 200 miles from the Purus. Above the Curykethé the banks are higher and the ground more undulating than below. The colonel estimates the number of wild Indians living on this river and its affluents at 8000.

**Africa.—Mr. Thomson's Travels in Morocco.**—The January issue of The Proc. Roy. Geog. Soc. contains a map of South-Western Morocco, reduced from the field maps of Mr. Joseph Thomson, who spent a part of last year in its exploration. The object of Mr. Thomson's journey was not only to extend our knowledge of a country the greater part of which is unexplored, but also to trace the parent sources of the infant civilization of Central Soudan.

From Tangiers to the Wady Tensift, on the way to Mogador, the country is a gently undulating upraised sea-bed, nowhere rising above 500 feet, and crossed by only one stream, the Um-cr-Rbia. Trees are absent and population scant. At the Tensift the area affected by the rising of the Atlas is reached, and the Tertiary gives way to Cretaceous lime-stones and shales, covered with a forest of the oil-tree called the "Argan," which lives where the olive cannot grow. Farther on, in the province of Shiedma, a crust of cemented calcareous particles practically seals up the soil from the husbandman.

From Mogador our traveler, with a party of men, returned to Saffi, and thence crossed the country to Morocco. The first part of the journey was over the raised sea-bed of Abda, the second over a higher step of the plateau called Bled Hammel, or the Red Country. The district of Rahanma, farther on, is composed of serrated ranges of denuded hills running parallel to the Atlas. The city of Morocco is in a great plain—the dried-up bed of an ancient lake. The first excursion was to the picturesque town of Demnat, situated in a most charming valley. A continuous boss or dyke of basalt marks for many miles the merging of the mountains from the plains. From Demnat excursions were made to the wonderful natural bridge-aqueduct of Iminifiri, and to Tasimset, south-west of Demnat. The great arch at Iminifiri is not only used as a bridge, but a stream which forms a cascade on one side of the gorge passes over it from its source on the other. From an elevation of 6000 feet near Tasimset it was evident that Cretaceous rocks not only formed the lower ranges, but the central mass of the Atlas. From Sidi Rehal, between Demnat and Morocco, a start was made for the higher peaks. After passing through glens with cliffs of red clays, red sandstone was reached. The pass of Tizi-n-Teluet was crossed at a height of 8381 feet. Compelled to turn back by the Kaid of Glauwa, the party followed the foot of the range south-westward, and the ascent of the Tizi Nemiri (9962 feet) was successfully performed.

Mr. Thomson had orders both from the Sultan and from the local Kaids not to venture into the mountains, and these orders seem to have been motived by a very reasonable desire for his safety, the mountain districts being semi-independent, and the natives jealous of intruders. Mr. Thomson was stoned, and had several narrow escapes from being shot. After a failure to ascend the gorge of the Urika, the Reraya glen was climbed, and the summit of Tizi Likunipt (13,151 ft.) was reached. Still later the end of the Atlas range was turned by the valley of a tributary of the Sus, the mountains of metamorphic rock rising to 6000 feet on one side, while on the other the Mtuga and Haha plateau of red sandstone rose only to some hundred feet.

**Mr. W. B. Harris' Travels in Morocco.**—Mr. W. B. Harris (Proc. Roy. Geog. Soc., Jan. 1889) gives an account of his visit in disguise to Sheshuan, a town some 60 miles south of Tetuan. The inhabitants are nearly all "Shorfa" or descendants of the Prophet, and it is death for a Christian to be discovered within the walls. Sheshuan is a walled town with seven mosques and five gates, its houses are built around patios or courts and have red-tiled roofs, there is a solid masonry bridge, and civilization is higher than in many more accessible towns. Mr. Harris's escape was little short of miraculous, and was largely due to his faithful Arab boy. Sheshuan does not acknowledge the authority of the Sultan.

After his visit to Sheshuan, Mr. W. B. Harris traveled without disguise among the fanatical tribes of the north-west mountains of Morocco, without molestation, and with every possible care for his well-being. This immunity was, however, due to his acquaintance with H. H. Mulai Mohammed, the Sherif or religious chief of Wazan, whose authority is great among these tribes which do not acknowledge the sway of the Sultan. His account of his excursion, in the August issue of the Proc. Roy. Geog. Soc., is illustrated by a map, upon which the local distribution of these tribes is mapped, the authorities for correctness being not only Mr. Harris, but Mulai Mohammed himself. Round Tangier are the Al Fahs, further inland the three small tribes of Beni M'sor, Wad Dras, and Beni Dir. Beyond these the Beni Arros have some small cities on the upper mountains, which are all well wooded with wild olive and cork. Between Tituan and Sheshuan are the Beni Hamar near the coast, and the Ghamara, Beni Hassan, Riff, Beni Ghorfad, Sheshuan and Lakhamis. The Beni Hassan is the most powerful tribe named here, and the Riff are Berbers, not speaking Arabic. South of Fez are the Berber tribes of Beni M'Tir and Beni M'Gild, and west of it the Zarun and the Zimmuri. In the Zarun is the sacred town of Mulai Idris, and Mulai Yakub, famous throughout Morocco for the healing powers of its hot springs. Here also are remains of the Roman city Volubilis. North of Fez are the Beni M'squilda, the Beni Zaran, and the large and important tribe of the Beni M'sara. Mr. Harris discribes this tribe as being for the most part fair, with blue eyes and yellow beards, handsome and well-built. They told Mr. Harris that their objection to Christians was based on the fear that they were spies, and would some day come with an army to take the country, but that a friend of Mulai Mohammed was welcome. The hill tribes of this part of Morocco seldom marry according to the law, but kidnap girls, who have a good time, dressed in velvet and silks, and doing no work of any kind. These girls perform ballets, and uncover their faces, often remakably beautiful, even before strangers. In the wars which arise through this kidnapping the women take part. With Mulai Mohammed himself Mr. Harris visited Ajin in the Ghruneh country north of Wazan. The Helserif, Beni Isof, and Beni Udeh, are other tribes between Wazan and

Sheshuan. To a recent demand of the Sultan for payment of taxes the Beni M'sara replied that they would pay them in bullets made of pesetas if he would send his soldiers to collect them.

**The French Slave Coast Possessions.**—M. A. L. D'Albeca (*Revue de Géographie*, September, 1889) gives some precise information respecting the French establishments on the Gulf of Benin. These are, in French orthography, Ogoué, Grand-Popo, Agomé Séva, Togodon, Whydah and its dependencies, Kotonou and territory, Lake Denham, with its posts of Aouansori and Afotonou, the river Ouémé, the kingdom of Porto Novo, the river and factories of Addo; and are situated on the slave coast, between 0° 4′ W. and 0° 36′ E. lat. of Paris. The frontage is 150 kilometres, and the boundaries are the German settlement of Togo westward, and eastward the English settlement of Lagos. The ideal line of demarcation between Togo and these settlements is prolonged to 9° N. lat. Outlets for commerce are looked for towards the middle course of the Niger. The river Addo, navigable for 70 miles, divides the French possessions from Lagos. It is the natural way to Abeokuta and Oye, two populous native centres. Through the action of the *barré* or Guinea current, there has been thrown up a line of sandbanks of varying width, behind which extends a series of brackish lagoons. The factories are on this *cordon littoral.* The entire coast is an unbroken sandbank, with nothing to orient the mariner save coco trees and the low tower of the church of Agoué. North of Grand-Popo and Whydah is a series of terraces which terminate in a wall at some distance from the ocean. The lagoon of Agoué, running west to east, empties into that of Grand-Popo, at the confluence of the latter with the Agomé river. The last-named lagoon, after passing Grand-Popo, Hevé, Agogo, and other factories, empties itself into the sea by the Bouche du Roi, near Arihoué. The Aroh river becomes navigable before entering the Whydah lagoon, which now no longer communicates with Lake Denham. It now runs westward, receives the Aroh, and finally mixes its waters with those of the lagoon of Grand-Popo. The Oueme forms the boundary between Porto Novo and Dahomey. The waters of this large river form Lake Denham, which communicates with the sea by the canal of Kotonou. The lagoon of Porto Novo communicates with Lake Denham, and is always navigable.

**Europe.—Corsican Railways.**—At the commencement of 1888, there was a department of France without a mile of railway in operation. The first lines, from Bastia to Corte, and from Casamozza to

Tallone, were opened on February 1. Yet Corsica has an area of 8747 square kilometres, and has been a part of France since 1769. Lack of means of communication has always hindered the development of this island; it has been difficult for the peasants to bring their produce into the towns. The topography of Corsica is peculiar. There are two systems of mountains: one, of granitic summits, rising to 2800 metres, and crossing the island transversely; the other, of stratified rocks, running north and south along the eastern coast. The streams which enter the sea on the western side, run at right angles to the coast, between high walls; those which flow eastward are among the mountains just mentioned, yet some unite to form the Golò and the Tavignano, the most important rivers of the island. Thus the basins are all independent, and hitherto there has been no force with power enough to link together the populations of the eastern and western coasts. The interior is a labyrinth of mountains. One climbs from village to village by *scale*, or ladder-like footpaths.

Eight national routes were planned, to surround the island and cross it diagonally; but only 403 kilometres of these roads are actually in good state. These roads were long ago found insufficient, and 440 kilometres were projected in 1878. The writer, M. Daniel Bellet, then describes the principal features along the two completed railways, and concludes by pointing out some of the advantages to commerce that will accrue from them.—*Revue de Géographie, June and July, 1889.*

**Progress in Russian Geology.**—A new sheet of the geological map of Russia covers the southern Urals. Contrary to current opinion, the great chain consists in its southern parts of a number of parallel chains, all running from southwest to northeast. The main waterparting is built up of granites, syenites and gneisses, considerably worn by denuding forces. Towards the east it has a steep slope, and its base disappears beneath the Tertiary, while toward the west it is overlaid by Devonian, Permian and Carboniferous, folded into parallel chains, rising more than 3300 feet above the sea. Farther west, the country is a plateau, built up of the nearly horizontal strata of a formation intermediate between the Permian and Carboniferous of Western Europe. Above this there are Triassic deposits.

M. Tchernysheff shows that the bituminous gray and dolomitic limestones of the Ural, once thought to be Silurian, and as a rule poor in fossils, are in truth lower Devonian. The same series of limestones, quartzites and shales, also arrayed in ridges running southwest to northeast, occurs in Siberia and Turkestan.

Another sheet of the map shows the region on the right bank of the lower Volga. Here upper Carboniferous strata occur only in the deeper ravines; the Cretaceous is represented by the Aptian and Neocomian of the lower Cretaceous, and by the Senomanian, Turonian and Senonian of the upper; but nearly the whole of the region is covered by Eocene clay and sands. Boulders are strewn over the surface in such a way as to cause Professor Sintsoff to conclude that the ice-sheet of Russia came down to the Volga under the fiftieth parallel.

**Asia and Oceanica.—The Transcaspian Railway.**—The Hon. G. Curzon, M. P., (Proc. Roy. Geog. Soc., May, 1889,) gives particulars of the history and construction of the great Transcaspian Railway, a train of which steamed, amid the roar of cannon and the playing of bands, into Samarkand on May 27, 1888. The road from Merv to the Oxus was made at the rate of from a mile to a mile and a-half a day. The average cost of construction, rolling stock and rails included, was £4500 per mile, but the cost on the spot did not exceed £2700. Most of the region traversed is flat as a billiard-table, and only three bridges: across the Tejmd, across the Murghab at Merv, and over the Amu Daria, were required in 900 miles. The chief difficulties arose from scarcity of water and superabundance of sand, and though the railway was built in spite of both, both will still be potent factors of expense and hindrance. Artesian wells were sunk, and failed; sea-water was distilled, but now water is taken to and fro in huge wooden vats attached to the trains, cisterns having been built wherever there is a natural supply. Most of the line is laid either on a solid argillaceous surface, with saline efflorescence on the top; or on a loose soil which nourishes camelthorn and other desert shrubs, and with irrigation would yield abundant crops. The shifting sands are limited to: (1) the first 30 miles from the Caspian; (2) the stretch between the Merv oasis and the Oxus, and (3) a narrow belt between the Oxus and Bokhara. Soaking the permanent way with sea-water, covering it with clay, driving light palisades into the tops of the dunes, and the planting of tamarisk, *Haloxylon ammodendron,* or saksau, etc., are among the means adopted to check the advance of this shifting sand over the line. All lighting is done with distilled petroleum. Daily trains run from the Caspian to the Oxus, twice a week beyond. Mr. Curzon then describes the principal points upon the railway, the course of which is, however, sufficiently familiar to the readers of the NATURALIST. He states that the crests, and even the valleys on the southern side of the crests, of the Persian border mountains that skirt 300 miles of the railway, are in Russian hands. The railway will doubtless ultimately be extended to Tashkent, the Russian capital of Central Asia, 190 miles northeast of Samarcand. According to General Aurankoff, the constructive engineer of the Trans-Caspian Railway, there is no reason why a considerable portion of Transcaspia cannot be reclaimed for agriculture. A broad belt of loess, interrupted with sands in a few places only, stretches from Kyzylarvat to Askabad along the foot of the Kopet-dagh, and further east along the Abrek. Chemical analysis proves it identical with that of China. The Turcomans, who are the worst of agriculturists, get at Merv a return of 170 to 1. The barkans or sandhills are naturally covered with vegetation, among which the saksau is the best plant, and this and other plants have increased rapidly near the railway since the prohibition to cut bushes within three miles of the line. At Merv, in the last three months of 1885 and the first four of 1886, sixty-five inches of rain, above the average of Great Britain, was recorded. But there are no summer rains, and thus irrigation is necessary, and with the Amu Daria at Chardjui 27 miles wide, and flowing 6½ miles an hour, an irrigation canal sems quite possible.

**The D'Entrecasteaux Islands.**—The Louisiade and D'Entrecasteaux islands form the subject of a long article in the Proc. Roy. Geog. Soc. for September of this year by B. H. Thomson. The natives of Rossel look like hybrids between Papuans and Solomon Islanders. Short, robust, and sooty brown, with wide nostrils, flat nose, and prognathous face, they seem to be in a low state of savagery. The men's dress consists of a single pandanus leaf secured round the waist by a cord of human hair. The women wear grass petticoats. The cartilage of the nose is bored, and that of the ear enlarged, but tattooing is not practised. Stone axes have been discarded for iron blades picked up from wrecks, and inserted in stone axe handles. The pig and the dingo are the only domestic animals. Rossel is well timbered, and mountainous, rich in plants, and surrounded by a barrier reef. Joannet is flat, with a semi-circle of hills on the southeast. St. Aignan contains more than 100 sq. miles, and is thickly peopled. It has a range 3500 feet high, and no barrier reef.

Normanby Island is an L-shaped range of mountains, not exceeding ten to twelve miles in width anywhere, and containing about 350 square miles. There is much schistose slate with quartz veins, and in the north there is limestone, basalt, and porphyry. The natives are characteristically Papuan in dress and person. This island is the eastern limit of the Wallaby, and also of the largest of the avian genus Manucodia. Ferguson Island, the largest of the D'Entrecasteaux, probably has 500 square miles, and its highest summit, Kilkerran, is 6000 feet. Goodenough Island has a range of mountains culminating in two peaks not less than 7000 feet high. The people proved quiet and friendly, and their houses, built on raised platforms, with curved roofs, and tapering from the end nearest the village square, are peculiar.

## GEOLOGY AND PALÆONTOLOGY.

**The American Association for the Advancement of Science.**—Numerous valuable papers were contributed to the Geological Section (E) at the late meeting at Toronto. We are indebted to our correspondent, Prof. Joseph F. James, for the following notes on some of them.

*Topographic Types of North-Eastern Iowa. By W. J. McGee.*—This paper was illustrated by a relief map of the section treated of, which showed the different character of the drainage channels of the district. In the extreme northeast was the dendritic system. In the lower portion the most peculiar feature was that the streams, instead of following the valleys, followed the ridges, and in them had frequently carved deep cañons for themselves. The cause of this was that the glacial period had so filled the valleys with drift deposits that on the retiring of the ice the streams were compelled to seek new channels, and these were easiest found along the ridges.

*Glacial Phenomena of Northern Indiana and North-eastern Illinois. By Frank Leverett.*—The writer detailed his investigations in the region in question, and mentioned in particular the moraines which he had followed in their windings. He mentioned one moraine which was so obscured that it was only by careful barometeric measurement that its presence could be detected. A profile, however, showed plainly the morainic character, with a long, gradual slope on one side, aud an abrupt one on the opposite. The lobations of some of the moraines were described, and mention made of the very different directions from which the materials were derived, even within a small area.

"*The Attractive Scenery of Our Own Land,*" was the title of a paper by Prof. A. S. Bickmore. In this the author described the